

# Executive Summary

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As Canada wrestles with meeting its commitment under the Paris Agreement to limit global temperature rise to well below 2°C, forest management has emerged as a complex aspect of the national carbon profile. This study makes an important contribution to this discussion by estimating the ongoing and legacy impacts of roads and roadside footprints from industrial logging for a large region of the boreal forest in Ontario.

Roads and roadside footprints (i.e., landings, pull-offs, roadside pits, and staging areas) in this region are highly visible **logging scars** on the landscape, most a direct result of full-tree harvesting (FTH): the predominant approach to clear-cut logging in Ontario. With FTH, full trees are dragged from the stump to the roadside, and from there, merchantable logs are separated from waste wood. FTH is also used elsewhere in Canada, including in British Columbia, Alberta, and Quebec. Surprisingly little research can be found documenting the impacts of “logging scars,” which means supported estimates for the extent of these impacts in Ontario are scarce.

This study fills a current knowledge (or data) gap by estimating the space that roads and landings occupy in FTH logged forests, based on an examination of 27 clearcuts across 35,000km<sup>2</sup> of boreal forest in northwestern Ontario. It also examines the overall state of renewal in these impacted areas. Research methods included remote sensing, based on aerial photography taken in 2011 for Ontario’s Forest Resource Inventory; geospatial analysis; and field verification, including drone and geotagged photography of site conditions. Fieldwork was carried out in August of 2017 and 2018.

## Key Findings

- The total logging scar footprint, combining roads and landings, studied across 27 clearcuts, is substantial; it occupies, on average, 14.2% of the area logged (ranging from 10.2% to 23.7%).
- Logging scars follow a highly consistent, spatial pattern of forest loss that results from Ontario’s practice of full-tree, clearcut logging.
- Landings are typically barren 20-30 years after logging. The loss of forests at this point in the harvest is dramatic compared to adjacent renewing areas.
- Twenty to thirty years after the clearcut, logging roads most commonly lack significant vegetation. Bare aggregate surfaces or track-bare features with flanking grasses to thick alder shrubs are the common conditions found.
- Little evidence was found that forest-loss ratios have improved over the past 30 years of full-tree logging in Ontario.
- Wood waste is a primary cause of logging scars. The roadside footprint observed in the study is at least partly driven by unwanted aboveground tree volume dragged to the road. This includes impacts from the roadside accumulation and processing of full trees, and the various fates of the large volume of residual processing waste.



## Boreal Logging Scars

An extensive and persistent industrial footprint in typical clearcuts of northwestern Ontario, Canada.

**Logging Scars** (def.) - *the umbrella term used in this study to represent the various spatial footprints left by industry in a clearcut after logging. They are the central subject of this research, and represent a loss of productive forest.*

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*Drone photo, 2018. Site 710. 25 years post-logging. Note: dense planted renewal, which contrasts logging scars more clearly, although “natural” renewal is more common in the region.*

## Implications

While the concept of deforestation seems clear and straightforward in cases where forests are converted to highways and urban growth, its application to clearcut logging infrastructure is confused and problematic.

The reality that roads and landings remain barren decades after logging - that is, de facto deforested - appears to have been largely ignored in forest management planning and reporting, land-use change accounting, wood-products life-cycle assessments, and forest-carbon policy discussions. Based on the average forest loss ratio found in this study, it can be estimated that approximately 21,700 ha are deforested each year in Ontario as a result of clear-cut logging infrastructure.

When this rate is considered over the last 30 years, Ontario has likely lost an estimated 650,000 ha of productive forest to forestry roads and landings due to clear-cut logging. This area is equivalent to 10 times the footprint of the City of Toronto, or about 1.5 times the size of Lake Nipigon.

If Canada was to fully report Ontario's deforestation due to clearcut logging scar losses, these results alone would be seven times greater than what is currently reported across the entire forest sector nationally. This despite the fact that only 17% of Canada's logging takes place in Ontario.

*The annual area lost to clearcut logging infrastructure in Ontario is more than seven times greater than the reported rate of forestry-incurred deforestation in all of Canada.*

*By 2030, these logging scars along with an additional 11 years of new ones, can be expected to have collectively cost 41 Mt of CO<sub>2</sub> in lost climate mitigation, while also growing the impacted area to almost 890,000ha.*

The related implications for carbon are also striking. The data from this study can be used to estimate the lost potential for climate change mitigation due to non-renewed logging scars: 16.5 Mt of CO<sub>2</sub> over this 30-year period, and counting.

By 2030, these logging scars, along with an additional 11 years of new ones, can be expected to have collectively cost 41 MtCO<sub>2</sub> of foregone climate mitigation, while also growing the impacted area to almost 890,000 ha.

If still essentially barren at 80 years - the next harvest scheduled for these forests - the foregone mitigation potential per harvest year could be as high as 9 Mt CO<sub>2</sub> for each year full-tree logging is employed in Ontario.

These data could also inform the carbon life-cycle analysis of wood materials. Given an average harvest of 21 million m<sup>3</sup> of wood volume per year in Ontario and the 2.5 Mt CO<sub>2</sub>/year cost estimate above - Ontario's boreal-sourced wood products come with an estimated carbon cost of 119 kg CO<sub>2</sub>/m<sup>3</sup>. This carbon cost must be factored into the Life Cycle Assessment (LCA) of wood material sourced from here, in addition to any other carbon debt incurred by the logging used to produce wood.

These current Ontario logging scars can also be expected to inhibit the renewal of up to 70 million m<sup>3</sup> of timber, meaning that this volume would not be available in the forest stands at the next logging rotation in about 50 years. This is equivalent to about three to four years of Ontario's wood supply, based on average logging (1990-2017).

## Summary Recommendations

The report concludes with recommendations including:

- Canada's rules for monitoring deforestation should be revised to address the critical risks from logging roads and landings.
- Canada's current underreporting of carbon impacts from logging requires immediate review and remedy.
- Canada should count and report all logging roads and landings as deforested by default until peer-reviewed evidence demonstrates forest renewal consistent with the surrounding area.
- Ontario must develop more effective and transparent oversight, and management of loss of productive forest from clear-cut forestry.